
Cedar River Chinook Redd Surveys and Carcass Collection: A review of abundance estimates, spawn timing, spawning habitat, and population age structure

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Recovery efforts for threatened and endangered salmonids are most likely to succeed when the specific life history characteristics and habitat preferences for specific salmonid stocks are well documented. Because anadromous salmonids usually home to their natal streams for spawning, they tend to have freshwater life history stages that are adapted to the specific habitat characteristics and selective pressures of their natal river basin. Understanding the freshwater behavior of listed salmonids as it relates to the specific habitat characteristics and aquatic communities of their natal watershed should facilitate better restoration efforts and higher probabilities for successful recovery.

Prior to 1999, chinook surveys in the Cedar River were limited to live fish counts recorded as part of the annual sockeye spawner surveys. In August 1999, Washington Department of Fish and Wildlife (WDFW) staff requested that Seattle Public Utilities (SPU) initiate the first chinook redd surveys in the Cedar River. In response, a cooperative effort between SPU, WDFW and King County was initiated to document chinook spawning activity in the mainstem and sidechannel habitats of the Cedar River. The current goals of the chinook redd surveys are to: 1) develop an understanding of the spatial and temporal distribution of chinook spawning activity in the Cedar River, 2) generate an alternative escapement estimate, 3) provide information to help evaluate the effectiveness of the Cedar River sockeye broodstock collection protocols that were developed to minimize adverse effects on chinook migration and spawning, 4) assess the incidence of sockeye redd superimposition on chinook redd mounds, and 5) document microhabitat conditions associated with chinook spawning sites (depth, substrate, velocity, distances to shores and riparian condition). In 2001, chinook carcass collection was added to the study design to document annual age compositions, size distributions and sex ratios for the Cedar River chinook population.

Chinook redds and carcasses are located from an inflatable raft during biweekly surveys of mainstem habitats from Landsburg Dam to Lake Washington. Sidechannel habitats are surveyed on foot. Chinook spawning activity was observed to occur between August 18th and November 19th with peak weekly redd counts typically observed between Oct. 3rd and Oct. 9th. Observations regarding the longitudinal distribution of chinook spawning suggest that most chinook will consistently spawn above river mile 9 with few chinook choosing to spawn below river mile 5. Peak redd counts tend to occur in river miles 14-18. Since 1999, no unusual aggregations of chinook redds have been observed immediately downstream of the sockeye broodstock collection facility located at river mile 6.5. Redds observed above the facility constitute 81%, 96% and 91% of the total annual redd counts for 1999, 2000 and 2001 respectively. Microhabitat measurements confirm that Cedar River chinook spawn within the range of depth, velocity and substrate size represented in the available literature for fall chinook. In addition, sockeye and chinook salmon have overlapping spawning habitat preferences in the

Cedar River as indicated by our documentation of sockeye redd superimposition on chinook redd mounds. Annual redd counts indicate that, in some years, fish count surveys used to develop Area Under the Curve escapement estimates can underestimate chinook abundance. Therefore, an annual redd count can serve as an alternate approach to estimate annual escapement and to evaluate the effectiveness of local recovery actions. Age composition data from 2001 and 2002 show substantial differences in the proportions of 3 and 4 year old spawners between cohorts. Long-term age composition data for Cedar River chinook can be combined with data for known causes of mortality (ie, harvest, floods and scour, ocean conditions, competition and predation) to provide the basis for cause and effect analyses regarding weak year classes. Such analyses should help prioritize the factors that limit the recovery of the Cedar River chinook population. The results of the 1999, 2000 and 2001 chinook redd and carcass surveys have added significantly to the understanding of chinook salmon ecology in the Cedar River Basin.